


533 Rec'd PCT/PTO 01 OCT 2001

FORM PTO-1390 (REV 10-94)		U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE	ATTORNEY'S DOCKET NUMBER 7524.24USWO
TRANSMITTAL LETTER TO THE UNITED STATES DESIGNATED/ELECTED OFFICE (DO/EO/US) CONCERNING A FILING UNDER 35 U.S.C. 371			U.S. APPLICATION NO. (If known, see 37 CFR 1.5) Unknown 09/937873
INTERNATIONAL APPLICATION NO. PCT/CH00/00093	INTERNATIONAL FILING DATE February 21, 2000	PRIORITY DATE CLAIMED April 1, 1999	
TITLE OF INVENTION METHOD FOR VACUUM DIECASTING AND DIECASTING MOULD			
APPLICANT(S) FOR DO/EO/US JUNG et al.			
Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:			
<ol style="list-style-type: none"> 1. <input checked="" type="checkbox"/> This is a FIRST submission of items concerning a filing under 35 U.S.C. 371. 2. <input type="checkbox"/> This is a SECOND or SUBSEQUENT submission of items concerning a filing under 35 U.S.C. 371. 3. <input checked="" type="checkbox"/> This express request to begin national examination procedures (35 U.S.C. 371(f)) at any time rather than delay examination until the expiration of the applicable time limit set in 35 U.S.C. 371(b) and PCT Articles 22 and 39(I). 4. <input type="checkbox"/> A proper Demand for International Preliminary Examination was made by the 19th month from the earliest claimed priority date. 5. <input checked="" type="checkbox"/> A copy of the International Application as filed (35 U.S.C. 371(c)(2)) <ol style="list-style-type: none"> a. <input checked="" type="checkbox"/> is transmitted herewith (required only if not transmitted by the International Bureau). b. <input checked="" type="checkbox"/> has been transmitted by the International Bureau. c. <input type="checkbox"/> is not required, as the application was filed in the United States Receiving Office (RO/US) 6. <input checked="" type="checkbox"/> A translation of the International Application into English (35 U.S.C. 371(c)(2)). 7. <input checked="" type="checkbox"/> Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. 371(c)(3)) <ol style="list-style-type: none"> a. <input type="checkbox"/> are transmitted herewith (required only if not transmitted by the International Bureau). b. <input type="checkbox"/> have been transmitted by the International Bureau. c. <input type="checkbox"/> have not been made; however, the time limit for making such amendments has NOT expired. d. <input checked="" type="checkbox"/> have not been made and will not be made. 8. <input type="checkbox"/> A translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371(c)(3)). 9. <input checked="" type="checkbox"/> An unsigned oath or declaration of the inventor(s) (35 U.S.C. 371 (c)(4)). 10. <input type="checkbox"/> A translation of the annexes to the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. 371(c)(5)). 			
Items 11. to 16. below concern document(s) or information included:			
11. <input type="checkbox"/> An Information Disclosure Statement under 37 CFR 1.97 and 1.98.			
12. <input type="checkbox"/> An assignment document for recording. A separate cover sheet in compliance with 37 CFR 3.28 and 3.31 is included			
13. <input checked="" type="checkbox"/> A FIRST preliminary amendment, with Marked-up Copy of Claims, Abstract. <input type="checkbox"/> A SECOND or SUBSEQUENT preliminary amendment			
14. <input type="checkbox"/> A substitute specification.			
15. <input type="checkbox"/> A change of power of attorney and/or address letter.			
16. <input checked="" type="checkbox"/> Other items or information: PCT/ISA/210; PCT/IPEA/409			

U.S. APPLICATION NO (if known, see 37 C.F.R. 1.5) Unknown 09/937873		INTERNATIONAL APPLICATION NO PCT/CH00/00093		ATTORNEY'S DOCKET NUMBER 7524.24USWO	
17. <input checked="" type="checkbox"/> The following fees are submitted: BASIC NATIONAL FEE (37 CFR 1.492(a) (1)-(5)): Search Report has been prepared by the EPO or JPO.....\$860.00 International preliminary examination fee paid to USPTO (37 CFR 1.492(a)(1)).....\$690.00 No international preliminary examination fee paid to USPTO (37 CFR 1.482) but international search fee paid to USPTO (37 CFR 1.445(a)(2)).....\$710.00 Neither international preliminary examination fee (37 CFR 1.482) nor international search fee (37 CFR 1.445(a)(3)) paid to USPTO \$1000.00 International preliminary examination fee paid to USPTO (37 CFR 1.482) and all claims satisfied provisions of PCT Article 33(2)-(4)\$100.00				CALCULATIONS PTO USE ONLY	
ENTER APPROPRIATE BASIC FEE AMOUNT =				\$860.00	
Surcharge of \$130.00 for furnishing the oath or declaration later than <input type="checkbox"/> 20 <input type="checkbox"/> 30 months from the earliest claimed priority date (37 CFR 1.492(e)).				\$	
CLAIMS	NUMBER FILED	NUMBER EXTRA	RATE		
Total claims	8 -20 = 0		X \$18.00	\$0	
Independent claims	2 -3 = 0		X \$80.00	\$0	
MULTIPLE DEPENDENT CLAIM(S) (if applicable)			+ \$260.00	\$	
TOTAL OF ABOVE CALCULATIONS =				\$860.00	
Reduction by 1/2 for filing by small entity, if applicable. Small entity status is claimed pursuant to 37 CFR 1.27				\$	
SUBTOTAL =				\$860.00	
Processing fee of \$130.00 for furnishing the English translation later than <input type="checkbox"/> 20 <input type="checkbox"/> 30 months from the earliest claimed priority date (37 CFR 1.492(f)).				+	\$
TOTAL NATIONAL FEE =				\$860.00	
Fee for recording the enclosed assignment (37 CFR 1.21(h)). The assignment must be accompanied by an appropriate cover sheet (37 CFR 3.28, 3.31). \$40.00 per property				+	\$
TOTAL FEES ENCLOSED =				\$860.00	
				Amount to be: refunded	\$
				charged	\$
a. <input checked="" type="checkbox"/> Check(s) in the amount of \$860.00 to cover the above fees is enclosed. b. <input type="checkbox"/> Please charge my Deposit Account No. _____ in the amount of \$ _____ to cover the above fees. A duplicate copy of this sheet is enclosed c. <input checked="" type="checkbox"/> The Commissioner is hereby authorized to charge any additional fees which may be required, or credit any overpayment to Deposit Account No. <u>13-2725</u> .					
NOTE: Where an appropriate time limit under 37 CFR 1.494 or 1.495 has not been met, a petition to revive (37 CFR 1.137(a) or (b)) must be filed and granted to restore the application to pending status.					
SEND ALL CORRESPONDENCE TO John J. Gresens MERCHANT & GOULD P.O. Box 2903 Minneapolis, MN 55402-0903					
				SIGNATURE:  NAME: John J. Gresens REGISTRATION NUMBER: 33,112	

09937873 09/29/2001
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S/N unknown

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant: JUNG et al. Serial No.: unknown
Filed: concurrent herewith Docket No.: 7524.24USWO
Title: METHOD FOR VACUUM DIECASTING AND DIECASTING MOULD

CERTIFICATE UNDER 37 CFR 1.10

'Express Mail' mailing label number: EL921133877US

Date of Deposit: October 1, 2001

I hereby certify that this correspondence is being deposited with the United States Postal Service 'Express Mail Post Office To Addressee' service under 37 CFR 1.10 on the date indicated above and is addressed to the Assistant Commissioner for Patents, Washington, D.C. 20231.

By: 

Name: Chris Stordahl

PRELIMINARY AMENDMENT

Box PCT
Assistant Commissioner for Patents
Washington, D. C. 20231

Dear Sir:

In connection with the above-identified application filed herewith, please enter the following preliminary amendments, based on claims amended in prosecution of the international application and published in the International Preliminary Examination Report, a copy of which is enclosed herewith:

IN THE ABSTRACT

Insert the attached Abstract page into the application as the last page thereof.

IN THE SPECIFICATION

A courtesy copy of the present specification is enclosed herewith. However, the World Intellectual Property Office (WIPO) copy should be relied upon if it is already in the U.S. Patent Office.

IN THE CLAIMS

Please amend claims 1-6 as follows:

1. (amended) A process for vacuum die casting for the production of high-quality cast parts made of metals and/or their alloys, with a mold cavity (5) and a casting chamber (6, 6'), as well as an injection channel of a die casting mold (1), being evacuated in a controlled way by means of a device for generation of partial vacuum and an isolation valve (16), characterized in that mold cavity (5) to be filled is first released when it has been degassed, and the casting chamber (6, 6') is closed until this time and is 100% prefilled with metal melt.
2. (amended) A process according to Claim 1, characterized in that the mould cavity (5) is evacuated while the casting chamber 6, 6' is being filled.
3. (amended) A process according to claim 1, characterized in that an opening of the casting chamber (6, 6') is closed by a valve (11).
4. (amended) A process according to claim 2, characterized in that an opening of the casting chamber (6, 6') is closed by a valve (11).
5. (amended) A die casting mold, particularly a vacuum die casting mold (1) for the production of cast parts from metals and/or their alloys, having a device (16) for evacuation of the mold cavity (5) and the casting chamber (6, 6'), particularly for performing the process according to claim 1, characterized in that an opening on the face of the casting chamber (6, 6') which lies opposite to the casting pluger (7), can be closed by a valve (11).
6. (amended) A diecasting mold according to claim 5, characterized in that the valve (11) is hydraulically controlled and provided with a seal (14).

Please add claims 7 and 8:

7. (new) A die casting mold according to claim 5, characterized in that the valve (11) is connected via a plunger rod (12) with a hydraulic element (13) in such a way that their temperatures are separate.
8. (new) A die casting mold according to claim 6, characterized in that the valve (11) is connected via a plunger rod (12) with a hydraulic element (13) in such a way that their temperatures are separate.

REMARKS

The above preliminary amendment is made to remove multiple dependencies from claims 3 and 6.

A new abstract page is supplied to conform to that appearing on the publication page of the WIPO application, but the new Abstract is typed on a separate page as required by U.S. practice.

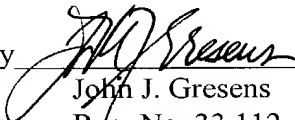
Applicants respectfully request that the preliminary amendment described herein be entered into the record prior to calculation of the filing fee and prior to examination and consideration of the above-identified application.

If a telephone conference would be helpful in resolving any issues concerning this communication, please contact Applicants' primary attorney-of record, John J. Gresens (Reg. No. 33,112), at 612.371.5265.

Respectfully submitted,

MERCHANT & GOULD P.C.
P.O. Box 2903
Minneapolis, Minnesota 55402-0903
(612) 332-5300

Dated: October 1, 2001

By 
John J. Gresens
Reg. No. 33,112

JJG/kas

Marked-up Copy of Claims

1. [Method for vacuum diecasting for the manufacture of high-quality castings from metals or their alloys, whereby, by means of a device for creating underpressure and a shutoff valve (16) a mould cavity (5) and a casting chamber (6, 6') and a casting channel of a diecasting mould (1) are evacuated in a controlled manner, whereby the mould cavity (5) to be filled is not cleared for use until it has been vented, and the casting chamber (6, 6') is closed up until this moment and is pre-filled to 100% with metal melts, characterized in that the casting chamber (6') is vented through a face-side aperture to the mould cavity (5), while the metal melts are already being moved by the casting piston (7) in the direction of this aperture.] A process for vacuum die casting for the production of high-quality cast parts made of metals and/or their alloys, with a mold cavity (5) and a casting chamber (6, 6'), as well as an injection channel of a die casting mold (1), being evacuated in a controlled way by means of a device for generation of partial vacuum and an isolation valve (16), characterized in that mold cavity (5) to be filled is first released when it has been degassed, and the casting chamber (6, 6') is closed until this time and is 100% prefilled with metal melt.
2. [Method] A process according to Claim 1, [characterised] characterized in that the mould cavity (5) is evacuated [during the filling of the casting chamber (6, 6')] while the casting chamber 6, 6' is being filled.
3. [Method] A process according to [claim 1 or 2] claim 1, [characterised] characterized in that an [aperture] opening of the casting chamber (6, 6') is closed by a valve (11) [and a separate venting process of the casting chamber (6') and the mould cavity (5) is carried out by means of a flow reduction channel (10) in the valve (11)].
4. [Diecasting mould, in particular a vacuum diecasting mould (1), for the manufacture of castings made of metals or their alloys, with a device (16) for the evacuation of the mould cavity (5) and the casting chamber (6, 6'), whereby a face-side aperture of the casting chamber (6'), located opposite of the casting piston (7), can be closed by a valve (11), in particular for carrying out the method according to the claim 1, characterized in that the valve (11) features a flow reduction channel (10)] A process according to claim 2, characterized in that an opening of the casting chamber (6, 6') is closed by a valve (11).
5. [Diecasting mould according to the claim 4, characterised in that the valve (11) is hydraulically controlled and is provided with a seal (14)]. A die casting mold, particularly a vacuum die casting mold (1) for the production of cast parts from metals and/or their alloys, having a device (16) for evacuation of the mold cavity (5) and the casting chamber (6, 6'), particularly for performing the process according to claim 1, characterized in that an opening on the face of the casting chamber (6, 6') which lies opposite to the casting pluger (7), can be closed by a valve (11).
6. A Diecasting [mould] mold according to [claim 4 or 5] claim 5, [characterised] characterized in that the valve (11) is [connected by means of a piston rod (12) to a hydraulics system (13), with temperature separation] hydraulically controlled and provided with a seal (14).

The invention relates to a method for vacuum diecasting and a diecasting mould (1), especially for diecasting components made of metal or the alloys thereof. The aim of the invention is to provide a better casting quality while simplifying the procedure of the method. To this end, the evacuation of the die cavity (5) and the filling with molten bath are carried out independently from one another.

WO 00/59658

PCT/CH00/00093

PROCESS FOR VACUUM DIE CASTING AND DIE CASTING MOLD

The invention concerns a process for vacuum die casting, particularly for the production of the partial vacuum in the casting chamber and the mold cavity of a die casting mold, as well as a die casting mold.

According to a vacuum die casting process according to the teaching of EP-B-51310, the molten metal is sucked by means of a partial vacuum into the casting chamber. The partial vacuum is induced in the casting mold by means of a suction channel. This partial vacuum is maintained until the casting mold is filled with metal melt by the feed motion of the casting plunger.

DE-A-4239558 also describes a process of this type, with the evacuation being improved and an application for the normal die casting process also being given. For this purpose, the partial vacuum is not only considered in regard to its size (pressure value and duration), but the vacuum is also to be adjusted to the exact conditions. This is to occur through a continuous regulation of the vacuum over the duration of application of the partial vacuum, particularly to prevent premature entry of metal melt into the mold cavity. The application of partial vacuum to the casting mold and/or casting chamber via at least one control valve occurs in such a way that the partial vacuum in the mold cavity and/or in the casting chamber is controlled, according to an adjustable curve with at least two time segments, as a function of the quantity introduced and/or the casting plunger path. This is costly and unreliable.

DE-A-19605727 shows a vacuum die casting machine in which the mold halves are sealed to one another by means of a sealing arrangement. In order to prevent

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pressing compressed air into the metal melt of the holding furnace, the casting plunger closes the suction tube during the partial vacuum phase.

... DE-PS-921881 shows blocking the pouring channel without degassing by means of a movable insert bushing.

An effective plunger seal in the form of a ring device for vacuum die casting is taught by DE-A-4312647. This is to prevent the casting material reaching the mold cavity before the plunger drives the shot into the mold cavity.

According to DE-C-3834777, a detection element is provided in a degassing device of a die casting machine which recognizes metal being poured in and outputs a signal. Premature penetration of metal can, however, not be prevented.

Performing oxygen measurement in the mold cavity is also known according to JP-A-10249511.

The invention thus has as its object the development of a process for vacuum die casting which avoids the disadvantages of the prior art, particularly through a simpler and more reliable process control, and allows improved casting quality and an increase of the available shot time. This object is achieved on the basis of the characterizing features of claim 1.

The basic idea of the invention consists of separating the evacuation procedure and the filling of the mold from one another and performing both procedures independently from one another. This object is achieved on the basis of the characterizing features of claim 1.

Advantageous embodiments are indicated in the respective sub-claims.

The invention is described more detail in the following in an exemplary embodiment with reference to a drawing. The drawing shows a simplified view of a casting chamber in the single figure.

A vacuum die casting mold 1 shown in a schematic and simplified illustration has a fixed mold plate 2 with a fixed mold insert 3 attached to it, which in the closed state fits with a movable mold half 4a with the mold insert 4b. The mold cavity 5 to be filled with metal melt is formed between the mold inserts 3, 4b.

Furthermore, the die casting mold 1 has a casting chamber 6 with a casting plunger 7 guided in it. By means of a metering opening 8a and/or 8b, feeding and metering of the metal melt occurs alternately from

The hydraulic element 13 is temperature-separated from the casting chamber 6 and mold due to the arrangement described.

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CLAIMS

1. A process for vacuum die casting for the production of high-quality cast parts made of metals and/or their alloys, with a mold cavity (5) and a casting chamber (6, 6'), as well as an injection channel of a die casting mold (1), being evacuated in a controlled way by means of a device for generation of partial vacuum and an isolation valve (16), characterized in that the mold cavity (5) to be filled is first released when it has been degassed, and the casting chamber (6, 6') is closed until this time and is 100 % prefilled with metal melt.
2. A process according to claim 1, characterized in that the mold cavity (5) is evacuated while the casting chamber (6, 6') is being filled.
3. A process according to claim 1 or 2, characterized in that an opening of the casting chamber (6, 6') is closed by a valve (11).
4. A die casting mold, particularly a vacuum die casting mold (1) for the production of cast parts from metals and/or their alloys, having a device (16) for evacuation of the mold cavity (5) and the casting chamber (6, 6'), particularly for performing the process according to claim 1, characterized in that an opening on the face of the casting chamber (6, 6') which lies opposite to the casting plunger (7), can be closed by a valve (11).
5. A die casting mold according to claim 4, characterized in that the valve (11) is

6. A die casting mold according to claim 4 or 5, characterized in that the valve (11) is connected via a plunger rod (12) with a hydraulic element (13) in such a way that their temperatures are separate.

PCT
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 Internationales Büro
 INTERNATIONALE ANMELDUNG VERÖFFENTLICHT NACH DEM VERTRAG ÜBER DIE
 INTERNATIONALE ZUSAMMENARBEIT AUF DEM GEBIET DES PATENTWESENS (PCT)



(51) Internationale Patentklassifikation ⁷ : B22D 17/14	A1	(11) Internationale Veröffentlichungsnummer: WO 00/59658 (43) Internationales Veröffentlichungsdatum: 12. Oktober 2000 (12.10.00)
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(21) Internationales Aktenzeichen: PCT/CH00/00093
(22) Internationales Anmeldedatum: 21. Februar 2000 (21.02.00)

(30) Prioritätsdaten:
 199 14 830.9 1. April 1999 (01.04.99) DE

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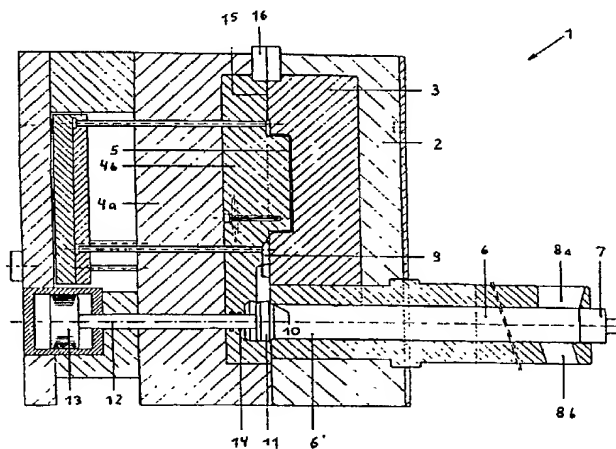
(74) Gemeinsamer Vertreter: BÜHLER DRUCKGUSS AG;
 Patentabteilung, CH-9240 Uzwil (CH).

(81) Bestimmungsstaaten: AE, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CR, CU, CZ, DE, DK, DM, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW, ARIPO Patent (GH, GM, KE, LS, MW, SD, SL, SZ, TZ, UG, ZW), eurasisches Patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), europäisches Patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI Patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).

Veröffentlicht
Mit internationalem Recherchenbericht.

(54) Title: METHOD FOR VACUUM DIECASTING AND DIECASTING MOULD

(54) Bezeichnung: VERFAHREN ZUM VAKUUM-DRUCKGIESSEN UND DRUCKGIESSFORM

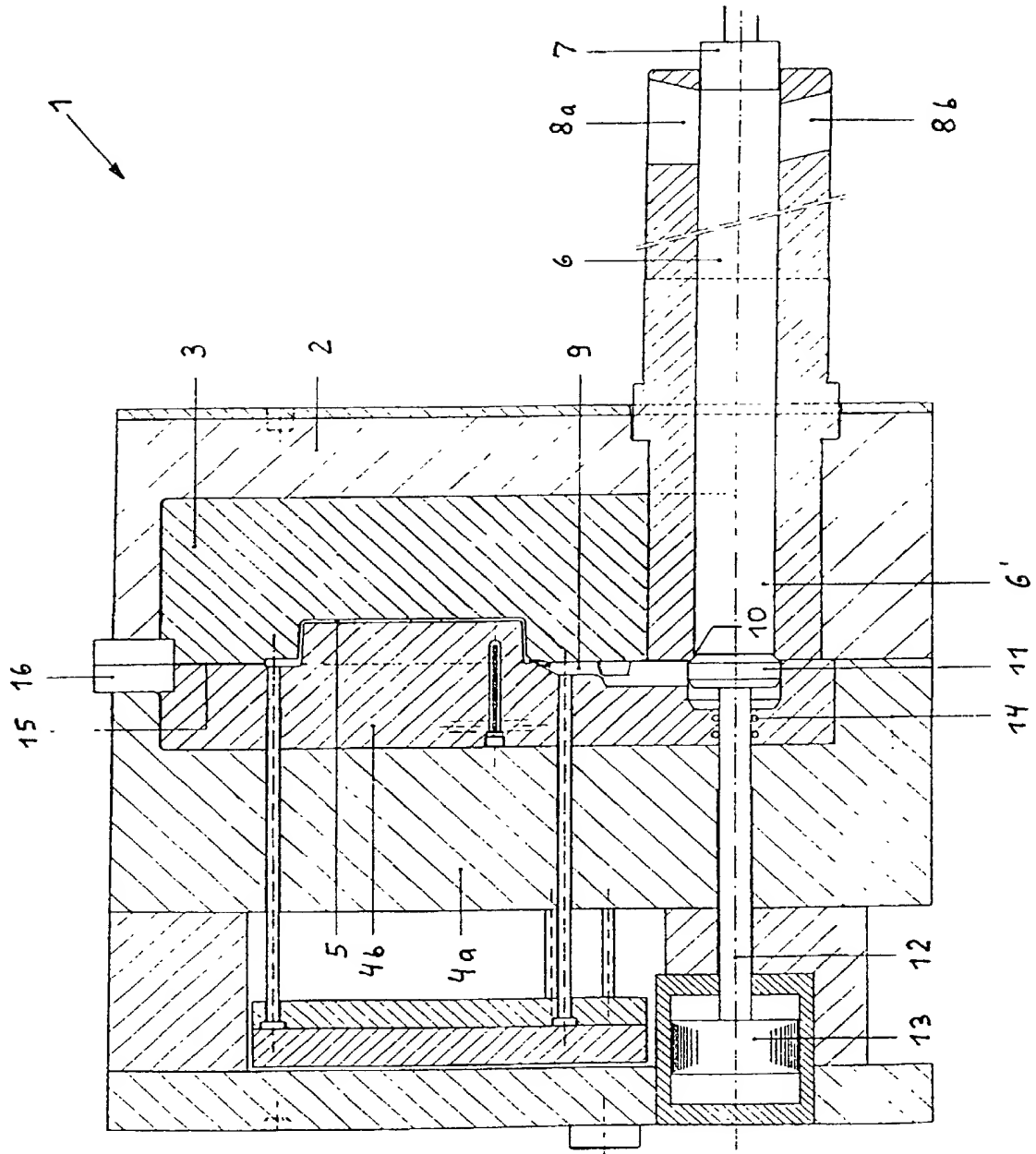


(57) Abstract

The invention relates to a method for vacuum diecasting and a diecasting mould (1), especially for diecasting components made of metal or the alloys thereof. The aim of the invention is to provide a better casting quality while simplifying the procedure of the method. To this end, the evacuation of the die cavity (5) and the filling with molten bath are carried out independently from one another.

(57) Zusammenfassung

Die Erfindung betrifft ein Verfahren zum Vakuum-Druckgiessen und eine Druckgiessform (1) hierzu, insbesondere zum Druckgiessen von Teilen aus Metallen oder deren Legierungen. Die Aufgabe besteht darin, eine bessere Gussqualität bei vereinfachter Verfahrensführung zu erreichen. Diese Aufgabe wird dadurch gelöst, dass die Evakuierung des Formhohlraumes (5) und die Füllung mit Metallschmelze unabhängig voneinander erfolgen.



MERCHANT & GOULD P.C.

United States Patent Application

COMBINED DECLARATION AND POWER OF ATTORNEY



As a below named inventor I hereby declare that: my residence, post office address and citizenship are as stated below next to my name; that

I verily believe I am the original, first and sole inventor (if only one name is listed below) or a joint inventor (if plural inventors are named below) of the subject matter which is claimed and for which a patent is sought on the invention entitled: METHOD FOR DIECASTING AND DIECASTING MOULD

The specification of which

- a. ☐ is attached hereto
b. ☒ was filed on _____ as application serial no. _____ and was amended on _____ (if applicable) (in the case of a PCT-filed application) described and claimed in international no. PCT/CH00/00093 filed February 21, 2000 and as amended on _____ (if any), which I have reviewed and for which I solicit a United States patent.

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above.

I hereby claim foreign priority benefits under Title 35, United States Code, § 119/365 of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate having a filing date before that of the application on the basis of which priority is claimed:

- a. ☐ no such applications have been filed.
b. ☒ such applications have been filed as follows:

FOREIGN APPLICATION(S), IF ANY, CLAIMING PRIORITY UNDER 35 USC § 119			
COUNTRY	APPLICATION NUMBER	DATE OF FILING (day, month, year)	DATE OF ISSUE (day, month, year)
Germany	199 14 830.9	April 1, 1999	
ALL FOREIGN APPLICATION(S), IF ANY, FILED BEFORE THE PRIORITY APPLICATION(S)			
COUNTRY	APPLICATION NUMBER	DATE OF FILING (day, month, year)	DATE OF ISSUE (day, month, year)

I hereby claim the benefit under Title 35, United States Code, § 120/365 of any United States and PCT international application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35, United States Code, § 112, I acknowledge the duty to disclose material information as defined in Title 37, Code of Federal Regulations, § 1.56(a) which occurred between the filing date of the prior application and the national or PCT international filing date of this application.

U.S. APPLICATION NUMBER	DATE OF FILING (day, month, year)	STATUS (patented, pending, abandoned)

I hereby claim the benefit under Title 35, United States Code § 119(e) of any United States provisional application(s) listed below:

U.S. PROVISIONAL APPLICATION NUMBER	DATE OF FILING (Day, Month, Year)

I acknowledge the duty to disclose information that is material to the patentability of this application in accordance with Title 37, Code of Federal Regulations, § 1.56 (reprinted below):

§ 1.56 Duty to disclose information material to patentability.

(a) A patent by its very nature is affected with a public interest. The public interest is best served, and the most effective patent examination occurs when, at the time an application is being examined, the Office is aware of and evaluates the teachings of all information material to patentability. Each individual associated with the filing and prosecution of a patent application has a duty of candor and good faith in dealing with the Office, which includes a duty to disclose to the Office all information known to that individual to be material to patentability as defined in this section. The duty to disclose information exists with respect to each pending claim until the claim is canceled or withdrawn from consideration, or the application becomes abandoned. Information material to the patentability of a claim that is canceled or withdrawn from consideration need not be submitted if the information is not material to the patentability of any claim remaining under consideration in the application. There is no duty to submit information which is not material to the patentability of any existing claim. The duty to disclose all information known to be material to patentability is deemed to be satisfied if all information known to be material to patentability of any claim issued in a patent was cited by the Office or submitted to the Office in the manner prescribed by §§ 1.97(b)-(d) and 1.98. However, no patent will be granted on an application in connection with which fraud on the Office was practiced or attempted or the duty of disclosure was violated through bad faith or intentional misconduct. The Office encourages applicants to carefully examine:

- (1) prior art cited in search reports of a foreign patent office in a counterpart application, and
 - (2) the closest information over which individuals associated with the filing or prosecution of a patent application believe any pending claim patentably defines, to make sure that any material information contained therein is disclosed to the Office.
- (b) Under this section, information is material to patentability when it is not cumulative to information already of record or being made of record in the application, and
- (1) It establishes, by itself or in combination with other information, a prima facie case of unpatentability of a claim;
- or
- (2) It refutes, or is inconsistent with, a position the applicant takes in:
 - (i) Opposing an argument of unpatentability relied on by the Office, or
 - (ii) Asserting an argument of patentability.

A prima facie case of unpatentability is established when the information compels a conclusion that a claim is unpatentable under the preponderance of evidence, burden-of-proof standard, giving each term in the claim its broadest reasonable construction consistent with the specification, and before any consideration is given to evidence which may be submitted in an attempt to establish a contrary conclusion of patentability.

- (c) Individuals associated with the filing or prosecution of a patent application within the meaning of this section are:
- (1) Each inventor named in the application;
 - (2) Each attorney or agent who prepares or prosecutes the application; and
 - (3) Every other person who is substantively involved in the preparation or prosecution of the application and who is associated with the inventor, with the assignee or with anyone to whom there is an obligation to assign the application.
- (d) Individuals other than the attorney, agent or inventor may comply with this section by disclosing information to the attorney, agent, or inventor.
- (e) In any continuation-in-part application, the duty under this section includes the duty to disclose to the Office all information known to the person to be material to patentability, as defined in paragraph (b) of this section, which became available between the filing date of the prior application and the national or PCT international filing date of the continuation-in-part application.

I hereby appoint the following attorney(s) and/or patent agent(s) to prosecute this application and to transact all business in the Patent and Trademark Office connected herewith:

Albrecht, John W.	Reg. No. 40,481	Leonard, Christopher J.	Reg. No. 41,940
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I understand that the execution of this document, and the grant of a power of attorney, does not in itself establish an attorney-client relationship between the undersigned and the law firm Merchant & Gould P.C., or any of its attorneys.

Please direct all correspondence in this case to Merchant & Gould P.C. at the address indicated below:

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I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

100	2	Full Name Of Inventor	Family Name JUNG	First Given Name Paul	Second Given Name
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Signature of Inventor 203: <i>Benno Niedermann</i>					Date: <i>12.11.2001</i>

VERIFIED STATEMENTS CLAIMING SMALL ENTITY STATUS (37 CFR 1.9(f) & 1.27(b)) - SMALL BUSINESS CONCERN

Applicant or Patentee: B.T.B.H. Holdings Limited

Serial or Patent No: 09/937,873

Filed or Issued: 27 March 2000

Title: Display Device

I hereby declare that I am

- ☐ the owner of the small business concern identified below;
☒ an official of the small business concern empowered to act on behalf of the concern identified below

NAME OF SMALL BUSINESS CONCERN B.T.B.H. Holdings Limited

ADDRESS OF SMALL BUSINESS CONCERN Offices 2, 7, 9 & 10, 22 Hera Street, 1521 Nicosia, Cyprus

I hereby declare that the above identified small business concern qualifies as a small business concern as defined in 13 CFR 121.12, and reproduced in 37 CFR 1.9(d), for the purposes of paying reduced fees to the United States Patent and Trademark Office, in that the number of employees of the concern, including those of its affiliates, does not exceed 500 persons. For purposes of this statement, (1) the number of employees of the business concern is the average over the previous fiscal year of the concern of the persons employed on a full-time, part-time or temporary basis during each of the pay periods of the fiscal year, and (2) concerns are affiliates of each other when either, directly or indirectly, one concern controls or has the power to control the other, or a third party or parties controls or has the power to control both.

I hereby declare that rights under contract or law have been conveyed to and remain with the small business concern identified above with regard to the invention described in:

- ☒ the specification filed herewith with title as listed above
☐ the application identified above
☐ the patent identified above

If the rights held by the above identified small business concern are not exclusive, each individual, concern or organisation having rights in the invention must file separate verified statements averring to their status as small entities, and no rights to the invention are held by any person, other than the inventor, who would not qualify as an independent inventor under 37 CFR 1.9(c) if that person made the invention, or by any concern which would not qualify as a small business concern under 37 CFR 1.9(d), or a non profit organisation under 37 CFR 1.9(e)

Each person, concern or organisation having any rights in the invention is listed below:

- ☒ no such person, or organisation exists
☐ each such person, concern or organisation is listed below.

Separate verified statements are required from each named person, concern or organisation having rights to the invention averring to their status as small entities (37 CFR 1.27).

I acknowledge the duty to file, in this application or patent, notification of any change in status resulting in loss of entitlements to small entity status prior to paying, or at the time of paying, the earliest of the issue fee or any maintenance fee due after the date on which status as a small entity is no longer appropriate. (37 CFR 1.28(b)).

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that wilful false statements and the like so made are punishable by fine or imprisonment, or both, under section 1001 of Title 18 of the United States Code, and that such wilful false statements may jeopardise the validity of the application, any patent issuing therein, or any patent to which this verified statement is directed

NAME OF PERSON SIGNING Ria Charalambous

TITLE OF PERSON IF OTHER THAN OWNER Director

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SIGNATURE Ria Charalambous DATE 24/10/2001